

Training and hormones in physically active women with and without oral contraceptive use

Lisbeth Wikström-Frisén

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Fakultetsopponent: Docent Cecilia Fridén
Institutionen för Neurobiologi, Vårdvetenskap och Samhälle,
Sektionen för fysioterapi, Karolinska Institutet (KI), Huddinge, Sverige.



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Author

Lisbeth Wikström-Frisén

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Abstract

Background: The number of women participating in sports has increased dramatically, though research in sports are often performed on men. Physical exercise is known to increase physical performance and improve well-being. Although exercise has beneficial health effects for most of the women, it is known that strenuous exercise may also have negative health consequences. Common are menstrual dysfunctions and the medical effects of a long-standing amenorrhea are serious. Moreover, strenuous exercise without adequate recovery may lead to overreaching (OR) /overtraining syndrome (OTS). An improved muscle strength are of great importance in many sports, hence an increased understanding on how to generate optimal strength training programs in women without negative side effects are essential. The aims of this thesis were to investigate the effects on strength and power of high frequency periodised leg resistance training to evaluate a training regime and moreover to investigate if the training was well accepted and without potential exercise-related negative consequences. Moreover, to provide normative data on oxytocin and cortisol to elucidate if these hormones could be one diagnostic marker in combination with others to monitor and diagnose female athletes that may be at risk to develop OR/OTS.

Methods: Fifty-nine women, participated in the four month intervention study. Two groups performed high frequency leg resistance training for two weeks of each menstrual/oral contraceptive (OC) cycle. The remaining part of the cycle they performed the leg training once a week. Group 1, trained with high frequency (5 times-w⁻¹) during the first two weeks of each cycle, and group 2, during the last two weeks of each cycle. A control group performed regular (3 times-w⁻¹) leg resistance training. Another 33 women participated in the observational study. The OC users and non-users, were followed over a nine-month period with monthly blood sampling of oxytocin and cortisol, and the Profile of Mood State (POMS) as a subjective measure of OR/OTS.

Results: The women who performed high frequency leg resistance training, 5 times-w⁻¹, during the first two weeks of each cycle showed significant increase in jump height, peak torque values in hamstrings, increased lean body mass of the legs, and their experiences of the training were positive. These results were not found when the periodized training was performed during the last two weeks of each cycle. In the control group an increase in jump height, and peak torque (left hamstring) was observed. There were no evident differences in the training effects between women with or without OC use. Moreover, no exercise-related negative consequences were detected in any of the three groups. The women in the observational study showed seasonal variations in oxytocin and cortisol, with different pattern in OC users to non-users. No convincing relationships to POMS were found.

Conclusions: The high frequency periodised leg resistance training during the first two weeks of the cycle is more beneficial to optimize resistance training, than the last two weeks. The high frequency periodised leg resistance training was not associated with exercise-related negative consequences and was well accepted when performed during the first two weeks of each cycle. Due to seasonality and impact of OC use, oxytocin and cortisol are not suggested to be optimal, diagnostic markers alone/in combination with others, to detect OR/OTS in physically active women.

Keywords

female athletes, hormones, menstrual cycle, oral contraceptive cycle, resistance training, muscle strength, power, body composition, female athlete triad, overreaching, overtraining syndrome

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